INCH-POUND
MIL-DTL-26894D
30 June 1998
SUPERSEDING
MIL-H-26894C
13 July 1976

DETAIL SPECIFICATION

HOSE AND HOSE ASSEMBLY, RUBBER, GASOLINE, REFUELING, LOW TEMPERATURE

This specification is approved for use by all Departments
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification contains the requirements for a low temperature, 4-inch ID gasoline refueling rubber hose and hose assembly.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center, Columbus, Code DSCC-VAI, 3990 East Broad Street, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 4720

QQ-P-416 - Plating, Cadmium (Electrodeposited)
TT-T-548 - Toluene; Technical
QQ-S-763 - Steel Bars, Wire, Shapes and Forgings, Corrosion Resistant

DEPARTMENT OF DEFENSE

MIL-PRF-5624 - Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST
MIL-R-6855 - Rubber: Synthetic, Sheets, Strips, Molded or Extruded Shapes, General Specification for
MIL-A-8625 - Anodic Coatings for Aluminum and Aluminum Alloys
MIL-C-11796 - Corrosion Preventive Compound, Petrolatum, Hot Application
MIL-A-21180 - Aluminum Alloy Casting, High Strength
MIL-DTL-31000 - Technical Data Packages, General Specification for

STANDARD

DEPARTMENT OF DEFENSE

MIL-STD-831 - Test Reports, Preparation of

(Unless otherwise indicated, copies of the above specifications and standards are available from Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense (DoD) adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/ASQC-Z1.4 - Sampling Procedures and Tables for Inspection by Attributes (DoD adopted)

(Application for copies should be addressed to the American Society for Quality Control, PO Box 3005, 611 East Wisconsin Avenue, Milwaukee, WI 53201-4606.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-D380 - Rubber Hose, Standard Test Method for (DoD adopted)
ASTM-D412 - Vulcanized Rubber, Thermoplastic Rubbers and Thermoplastic Elastomers - Tension, Standard Test Methods for (DoD adopted)
ASTM-A967 - Chemical Passivation Treatments for Stainless Steel Parts, Standard Specification for (DoD adopted)

ASTM Manual for Engine Test for Rating Fuels

(Application for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO4649 - Rubber - Determination of Abrasion Resistance Using a Rotating Cylindrical Drum Device

(Request for copies should be addressed to International Organization for Standardization, Case Postale 56, Geneva, Switzerland CH-1211.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

AS1933 - Age Controls for Hose Containing Age-Sensitive Elastomeric Material (DoD adopted)

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-6001.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), samples shall be submitted for first article inspection in accordance with 4.2.

3.2 Material. Materials shall be as required in this specification and shall conform to all applicable Government specifications and drawings, except as otherwise specified herein. Materials which are not covered by specifications, or which are not specifically described herein, shall be of the quality appropriate for the purpose intended (see 6.1).

3.2.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3 Design and construction. Unless otherwise specified in the contract or in the purchase order (see 6.2), the hose shall consist of the following components:

a. a compounded inner tube (see 3.3.1.1)
b. braided, loomed or plied-type reinforcement (see 3.3.1.2)
c. a helix wire (see 3.3.1.3)
d. a compounded cover (see 3.3.1.4)

3.3.1 Hose. The hose shall be no more than eight quarters old from the cure date to the date of delivery to the procuring activity or to the manufacturers of hose couplers and other accessory equipment. The hose assembly installed in equipment shall be no more than sixteen quarters old upon the date of delivery of that equipment to the procuring activity. The cut hose ends shall be sealed with a sealant or cement. Definitions for “cure date” and “quarter” can be found in AS1933.

3.3.1.1 Tube. The tube shall be made from a synthetic rubber compound resistant to high aromatic aviation fuel. The thickness of the tube shall be not less than 0.094 inch and its diameter shall be uniform to within ±0.031 inch. The bore of the tube shall be smooth, free from pitting, cuttings, borings or cements.

3.3.1.2 Reinforcement. The reinforcement shall be evenly and firmly braided, loomed, or plied. It shall be free from defects, dirt, knots, lumps, and irregular twisting.

3.3.1.3 Helix wire. The helix of round wire, made from steel free of corrosion, shall be embedded in synthetic rubber between reinforcing members. The diameter of the wire shall be not less than 0.078 in. Its tensile strength shall be not less than 180,000 psi. The wire shall extend at least to under the middle coupling strap.

3.3.1.4 Cover. The cover shall be constructed of compounded polychloroprene rubber and shall be abrasion resistant (see 3.4.3). It shall be smooth, free from pitting, and shall have a uniform thickness of not less than 0.063 inch.

3.3.2 Couplings. Unless otherwise specified, couplings shall not be provided. When couplings are required, they shall be non-reattachable, threaded (see 3.3.2.2) and of the male or female type as specified by the procuring activity (see 6.2). The bore shall be smooth. The female coupling nut shall swivel freely by hand. An appropriate gasket shall be used to ensure that the nut is leaktight. The shank of the body shall have a rounded outer edge to prevent cutting of the hose during installation or from sharp bending during usage. The body shall be securely attached to the hose. There shall be no protruding clamps or fasteners. If a sleeve is used, the sleeve shall extend beyond the end of the body when installed. If straps are used, the body shank shall have a length of not less than 5 inches, and the number of barbs separated by a strap shall be not less than two.

3.3.2.1 Coupling chemical composition. If supplied, the body, nut and sleeve shall be a 300 series stainless steel conforming to QQ-S-763, passivated in accordance with ASTM-A967, or high grade brass whose composition shall contain no less than 58 percent copper. MIL-A-8625 anodized high tensile strength aluminum, type 354 casting alloy conforming to MIL-A-21180 or aluminum alloy wrought of other than the 2000, 4000 and 7000 series may also be used. If used, the grip wire shall be corrosion resistant steel or carbon steel. Grip wire of carbon steel shall be protected against corrosion by either cadmium plating in accordance with QQ-P-416, type II, class 2 or by any other equivalent method that meets the corrosion resistance requirement of QQ-P-416. If straps are utilized, they shall be of a 300 series stainless steel conforming to QQ-S-763, passivated in accordance with ASTM-A967. If gaskets are provided, they shall be of rubber conforming to MIL-R-6855.

3.3.2.2 Coupling threads. Both the male and female type couplings shall be threaded with 4-inch American National pipe threads.

3.3.2.3 Coupling caps. Each coupling shall be provided with a protective closed-end, reusable, threaded, metal cap. The thickness of the cap shall be not greater than 0.031 inch and not less than 0.025 inch. The cap shall not be chemically affected by the corrosion-preventive compound conforming to class 1 of MIL-C-11796.

3.4 Performance.

3.4.1 Length change. The length of the hose shall not change more than 7 percent when subjected to the applicable tests specified in 4.4.

3.4.2 Adhesion between tube and adjacent parts. When tested in accordance with 4.4.3, the rate of separation between tube and plies, between plies, and between cover and plies shall be not greater than 1 in/min when tested under a load of not less than 5 lb/in.

3.4.3 Abrasion resistance of the cover. When subjected to testing in accordance with 4.4.4, the volume of material abraded from the cover shall be not greater than 160 mm^3.

3.4.4 Burst resistance. The hose shall not burst or develop a permanent blister when tested in accordance with 4.4.5.

3.4.5 Low temperature flexibility. When tested in accordance with 4.4.6, the force required to open the concave hose to approximately 90° angle shall be not greater than 125 lb.

3.4.6 Low temperature bend. Samples of both the tube and cover shall not crack tested in accordance with 4.4.7.

3.4.7 Volume increase. When tested in accordance with 4.4.8, the volume increase of the tube and cover shall be not greater than 30 and 60 percent, respectively.

3.4.8 Tensile strength. When tested in accordance with 4.4.9, the tensile strength of the tube and cover shall be not less than 600 and 400 psi, respectively.

3.4.9 Ultimate elongation. When tested in accordance with 4.4.9, the ultimate elongation of the tube and cover before immersion shall be not less than 200 percent. After immersion, the ultimate elongation of the tube and cover shall be not less than 100 percent.

3.4.10 Pull resistance. When tested in accordance with 4.4.10, the distance between the white marking and the adjacent coupling shall be not greater than 0.062 inch. The hose assembly shall neither break nor shall its couplings disconnect from the hose.

3.4.11 Crush resistance. After being subjected to testing in accordance with 4.4.11, the OD of the hose shall be not less than 95 percent of its original size.

3.4.12 Proof pressure. When tested in accordance with 4.4.12, the hose shall not crack, leak or malfunction in any way.

3.4.13 Surge pressure cycling. The hose assembly shall not leak or burst during or at the completion of 500 cycles of surge pressure when tested in accordance with 4.4.13.

3.5 Interchangeability. All hose bearing the same manufacturer's part number shall be functionally and dimensionally interchangeable. MIL-DTL-31000 shall govern the designation of manufacturer’s part numbers and changes thereto.

3.6 Dimensions.

3.6.1 Diameter. The hose assembly shall have an inside diameter of 4 ±0.031 inch and an outside diameter of 4.875 ±0.063 inch.

3.6.2 Length. The length of the hose shall be as specified by the procuring activity (see 6.2) with a tolerance of ±1 percent. Length measurement shall not include the couplings.

3.7 Weight. The weight of the hose shall be not greater than 4 lb/ft.

3.8 Identification of product. The hose shall be legibly marked along its longitudinal axis with a fuel-resistant yellow stripe. The stripe shall be broken at approximately 2-inch intervals.

3.8.1 Labeling. A label, vulcanized and inlaid approximately in the center on each length of hose, shall contain the following information:

- MIL-DTL-26894D
- Date of Manufacture (quarter and year)
- Contract or Order No.
- Manufacturer's Name or Trademark

3.9 Workmanship. The hose assembly shall be uniform in quality and shall be free from irregularities, defects, or foreign matter which may adversely affect the service performance.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.2)
b. Conformance inspection (see 4.3).

4.2 First article inspection. When specified (see 6.2), samples that are representative of the production item shall be submitted to the Government after award of a contract for first article inspection. First article inspection consists of performing all examinations and tests required in this specification on samples submitted by the manufacturer to determine whether the production item meets the requirements of this specification.

4.2.1 Samples. Unless otherwise specified, the following samples shall be subjected for first article inspection as specified in 4.2.2. The samples shall be representative of the construction, workmanship, components and materials to be used during production. Samples subjected to destructive testing shall not be submitted as part of the contract or order.

a. a 10-foot length of uncoupled hose
b. a 3-foot length of hose with couplings and caps attached
c. a 15-inch length of hose with couplings attached

4.2.2 Testing of first article. First article inspection shall consist of all the tests specified in 4.4. Rejection and retest criteria shall be as specified in 4.3.2.3.

4.2.3 Test report. Upon completion of the first article inspection, a test report shall be prepared in accordance with MIL-STD-831 and submitted to the procuring activity. All applicable inspection reports, recommendations and comments useful in monitoring production shall be forwarded to the Government quality control representative.

4.3 Conformance inspection. Conformance inspection shall be performed to determine whether the products conform with the requirements set forth in this specification and shall consist of the following:

a. Individual tests (see 4.3.1)
b. Sampling plan and tests (see 4.3.2)

4.3.1 Individual tests. Each hose shall be subjected to the following examination and test. Lot acceptance and rejection criteria shall be as specified in 4.3.2.3.

a. Examination of products (see 4.4.2)
b. Proof pressure test (see 4.4.10) except that the pressure shall be held for not less than 30 seconds but not greater than 2 min.

4.3.2 Sampling plan and tests.

4.3.2.1 Sampling. Sampling shall be performed in accordance with ANSI/ASQC-Z1.4, inspection level S-2.

4.3.2.2 Samples and tests. Test samples, selected in accordance with 4.3.2.1, shall be subjected to all the tests specified in 4.4. Specimens shall be of sufficient length for the performance of the required tests. Samples subjected to destructive testing shall not be submitted as part of the contract or order.

4.3.2.3 Rejection and retest. When one or more items selected from a lot fails to meet all the requirements specified herein, the entire lot shall be rejected. Samples may be submitted for retesting only after the manufacturer has furnished details concerning the previous rejection and the action taken to correct the defects in the lot.

4.4 Tests.

4.4.1 Test methods and conditions. Testing shall be performed in accordance with table I under the conditions specified for each particular test. Unless otherwise specified, testing at room temperature shall be performed at 75 ±10°F. When required for testing, couplings that are provided as part of the contract or order (see 6.2) shall be used. When couplings are not specified in the contract or order, any type of couplings may be used for testing as long as they meet the requirements of 3.3.2.

4.4.2 Examination of products. The hose or hose assembly shall be visually examined for the following defects:

- Dimensions not as specified
- Materials not as specified
- Hose not as specified
- Coupling halves not as specified (if provided)
- Identification marking missing, illegible, or not as specified
- Exterior color of hose lay-line, not as specified
- Workmanship not as specified

TABLE I. Test methods.

Requirement	Requirement Paragraph	Test Method Paragraph
Length change	3.4.1	---
Adhesion between tube & adjacent parts	3.4.2	4.4.3
Abrasion resistance of the cover	3.4.3	4.4.4
Burst resistance	3.4.4	4.4.5
Low temperature flexibility	3.4.5	4.4.6
Low temperature bend	3.4.6	4.4.7
Volume increase	3.4.7	4.4.8
Tensile strength	3.4.8	4.4.9
Ultimate elongation	3.4.9	4.4.9
Pull resistance	3.4.10	4.4.10
Crush resistance	3.4.11	4.4.11
Proof pressure	3.4.12	4.4.12
Surge pressure cycling	3.4.13	4.4.13

4.4.3 Adhesion between tube and adjacent parts. A 12-inch length of hose shall be stoppered with leakproof plugs and filled with the mixed hydrocarbon fluid specified in table II. The filled specimen shall be held at 75 ±5°F for 72 hours. Within 15 minutes after removal of the fluid, ring specimens shall be obtained from the center of the hose length and tested in accordance with ASTM D413. Conformance shall be as specified in 3.4.2.

TABLE II. Hydrocarbon fluid composition.

Ingredient	Volume percentage at 60°F
Iso-octane (2,2,4 trimethylpentane) 1/ Toluene 2/	70 30

1/ Fluid shall conform to ASTM Manual of Engine Test Methods for Rating Fuels.
2/ Fluid shall conform to TT-T-548.

4.4.4 Abrasion resistance of the cover. Samples shall be tested in accordance with ISO4649, method A. Conformance shall be as specified in 3.4.3.

4.4.5 Burst resistance. Testing shall be conducted in accordance with ASTM D380. Application of hydraulic pressure shall be not less than 700 psi. Conformance shall be as specified in 3.4.4.

4.4.6 Low temperature flexibility. An uncoupled 5 ft length of hose shall be bent into a concave shape so that the ends of the hose are approximately 40 inches apart. A longer length of hose may also be used by coiling it into a 40-inch diameter circle. The hose shall be tied to retain the U or circular shape and then exposed to –67 ±2°F for not less than 72 hrs. While the temperature is at –67 ±2°F, the hose shall then be forced open to an angle of approximately 90°. The force required to open the hose shall be recorded. Conformance shall be as specified in 3.4.5.

4.4.7 Low temperature bend. Buffed specimens of the tube and cover, 4 inches long and 0.250 inch wide, shall be clamped in a concave shape between 2-inch wide plates held at 2.500 inches apart. When the plates are brought together so that the distance between the ends are not greater than 1.250 inches, the bend in the test specimen shall not protrude beyond the edges of the plates. After 72 hours exposure at –67 ±2°F, the plates shall be moved rapidly together until the ends of the specimen are not more than 1 inch apart. Conformance shall be as specified in 3.4.6.

4.4.8 Volume increase. The weight of water displaced by each of three 1-inch by 2-inch buffed specimens for the tube and cover shall be determined before and after a 24 hours immersion at 75 ±5°F in the hydrocarbon fluid specified in table II. Conformance shall be as specified in 3.4.7.

4.4.9 Tensile strength and ultimate elongation. Testing shall be in accordance with ASTM D412. The tube and cover test specimens shall be obtained from die C. Tube specimens shall be buffed to a thickness of not less than 0.050 inch. Immersion shall be for 48 hours at 75 ±5°F in the mixed hydrocarbon fluid specified in table II. Testing shall be conducted within 5 minutes after removal from the fluid. Conformance shall be as specified in 3.4.8 and 3.4.9.

4.4.10 Pull resistance. A white circumferential line shall be drawn around the hose along the edge of the coupling at one end of a 15-inch hose assembly. The coupling with the white marking shall then be held securely in a vise. A pull of not less than 2000 lb shall be applied by any convenient means to the coupling at the other end of the hose assembly. The 2000 lb pull shall be maintained for not less than 60 seconds. The jaw separation rate, exerted by the test apparatus between the couplings, shall be not less than 1 in/min. Conformance shall be as specified in 3.4.10.

4.4.11 Crush resistance. A 4-foot section of hose shall have its OD measured prior to testing. Two feet of the hose shall then be rigidly supported on a horizontal plane while a 50 lb weight shall be attached to the unsupported end of the hose. The weight shall hang freely for a duration 60 ±10 sec. After 60 sec, the weight shall be detached and the hose shall be allowed to recover. Recovery time shall be not less than 10 min but not greater than 12 min. Following the recovery period, the OD of the hose shall then be measured. Conformance shall be as specified in 3.4.11.

4.4.12 Proof pressure. Except for the individual tests specified under conformance inspection (see 4.3 and 4.3.1), the test specimen used for the proof pressure test shall be the same 4-foot section of hose that has already been subjected to the crush resistance test (see 4.4.11). Testing shall be in accordance with ASTM D380. The hose shall be subjected to a hydrostatic pressure of 350 psi for not less than 3 min but not greater than 5 min. Conformance shall be as specified in 3.4.12.

4.4.13 Surge pressure cycling. The test sample shall be a hose assembly completely filled with the hydrocarbon fluid specified in table II or grade JP-4 fuel conforming to MIL-PRF-5624. The specimen shall be held at atmospheric pressure and normal room ambient temperature for 7 days. At the completion of this period, the hose assembly shall be subjected to the following sequence of tests. Conformance shall be as specified in 3.4.13.

a. The fluid pressure shall be increased from 100 ±10 psig to 350 ±10 psig within 0.8 sec and then immediately decrease to 100 ±10 psig within 0.8 sec.

b. The pressure shall then be held at 100 ±10 psig for not less than 10 sec.

c. Steps “a” and “b” above shall be repeated until 500 cycles have been completed. The number of cycles recorded shall be cumulative and tests may be run continuously or intermittently.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point’s packaging activity within the Military Department or Defense Agency, or within the Military Department’s System Command. Packaging data retrieval is available from the managing Military Department’s or Defense Agency’s automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful but is not mandatory.)

6.1 Intended use. The hose assembly covered by this specification is intended for use as an integral part of a gasoline or jet fuel-dispensing system for installation on a type MH-2 refueling trailer conforming to MIL-T-26887.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification, including any amendments.

b. Issue of DoDISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.2 and 2.3).

c. Required length and quantities of hose (see 3.6.2).

d. Male or female couplings, if required (see 3.3.2).

e. Name and address of Government facility where the first article inspection samples are to be submitted, if required (see 4.2 and 6.3).

f. Packaging requirements (see 5.1).

6.3 First article inspection requirements. When a first article inspection is required, testing shall be performed under the appropriate provisions of 7-104.55 of the Armed Services Procurement Regulation. First article samples should be selected from the initial procurement items. Contracting officer should include specific instructions in all procurement instruments, regarding arrangements for examinations, test and approval of the first article.

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodians:
Air Force - 99

Preparing activity:
DLA - CC

Review activities:
Air Force - 82

(Project 4720-0182)